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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/626,622	07/27/2000	Tan Du	TI-31084	2477

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EXAMINER	
PALADINI, ALBERT WILLIAM	
ART UNIT	**PAPER NUMBER**
2125	

DATE MAILED: 08/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/626,622	DU ET AL.	
	Examiner	Art Unit	
	Albert W Paladini	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 July 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/27/00*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 28 is objected to because of the following informalities: There are two claims labeled 28. The second should be amended to be claim 29. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-31 are rejected under 35 U.S.C. 102(b) as being anticipated by McCleer (5387854).

In figure 1 McCleer discloses a model of one phase of a three-phase machine where each phase is connected to a center tap, and where the self-inductance of each phase, the mutual inductance between phases, the back emf, and the leakage current are included in the model. McCleer states from line 52 in column 4 to line 10 of column 5 "Each phase of the machine and drive is represented by the circuit model shown in FIG. 1. The half-bridge voltage source drive is fed by a DC bus of constant bus voltage V.sub.o. High and low side switching devices QH and QL are provided, and these may be any suitable gated solid-state switching elements such as bi-polar junction transistors, insulated-gate bi-polar transistors, field effect transistors, or gate turn-off thyristors. The high and low side switching devices QH and QL are each shunted by anti-parallel wheeling diodes DH and DL, respectively. These serve as wheeling paths for inductive currents in the phase winding when either QH or QL is turned-off while still conducting current. The resistance R is the total resistance of the .alpha.-phase winding, L is the self-inductance of the winding, e.sub..alpha. is the back emf induced in the winding due to rotation of the rotor magnets, and v.sub.n is the instantaneous value of the voltage of the neutral connection with respect to the low side of the DC bus. The flux linkages within the .alpha.-phase winding due to stator currents are given by ##EQU4## where the summation is taken over the remaining phases within the machine; and M.sub..alpha..beta. is the

mutual inductance between .alpha. and .beta. windings." Specific calculations for self-inductance mutual inductance including the back emf are given on lines 14-51 in column 5. McCleer provides power and monitors the output in order to obtain data for smoothing the torque characteristics of a multiphase machine. McCleer does not explicitly discuss the phase inductance component recited in claims 4-6,9, 11-13, 21 22, 25-26, and 30-31. The examiner takes official notice that the phase inductance component is common knowledge and normally calculated by one of ordinary skill in the field. This is demonstrated in the instant specification in the last equation on page 14 where the phase inductance is a function of self-inductance and mutual inductance. The calculations depicted are traditional circuit equations. Plunkett (4258302) also supports the fact the phase inductance is commonly known on lines 26 to 46 in column 3 where he states "FIG. 1 illustrates an inverter-synchronous machine drive system 10 comprised of a synchronous machine 12 which is excited from a unidirectional current source, shown as a battery 14, by an inverter 16. Inverter 16 typically comprises a plurality of pairs of serially-coupled, solid state switching devices, such as thyristors, corresponding in number to the number of synchronous machine phases. Thus, when synchronous machine 12 is configured of a three phase synchronous machine, inverter 16 comprises three pairs of serially-coupled thyristors 16a and 16d, 16b and 16e and 16c and 16f, which pairs are each coupled across the serial combination of battery 14 and a current sensor 15. The junction between each of thyristors 16a and 16d, 16b and 16e and 16 c and 16f, respectively, is coupled to an associated one of phases 18a, 18b and 18 c, respectively, of synchronous machine 12, with each machine phase such as 18a being represented by the serial combination of a phase inductance 19a' and a voltage source 19a" representing back electromotive force (EMF)."

Relevant Prior Art

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tang (5717298) discloses a brushless DC motor start circuit where a model of a reference zero-crossing signal is implemented. Tang also discusses prior art for rotor position detection where self and mutual inductance between winding is measured as a function of rotor position.

Lipo (5825113) discloses a permanent magnet, variable inductance machine that utilizes a simulation based on a finite element analysis where only several rotor positions

were chosen to calculate inductances as function of current. Between any two adjacent positions, a linear relation was assumed to interpolate the values of inductances. Self inductance, mutual inductances are calculated, and the phase back-emf is calculated as a function of the magnet flux leakage.

Yamada (6107774) discloses an apparatus, method, and model for controlling a three phase motor considering the resistance and the self inductance corresponding to each phase of the winding, and the mutual inductance between each phase.

5. Any inquiry concerning this communication or earlier communication from the examiner should be direct to Albert W. Paladini whose telephone number is (703) 308-2005. The examiner can normally be reached from 7:30 to 3:30 PM on Monday, Tuesday, Thursday, and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Leo P. Picard, can be reached on (703) 308-0538. The official fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Albert W. Paladini
Primary Examiner
Art Unit 2125

July 29, 2004